Nearly zero X ray CTI Ablation guided by Novel Local Impedance and Contact Force Catheter

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INTRODUCTION

Nowadays, the cornerstone of cavotricuspid isthmus (CTI) dependent atrial flutter treatment is radiofrequency catheter ablation (RFCA) along the CTI[1]. The final aim of this procedure is to achieve bidirectional conduction block, which is associated with long term high success rates. Several parameters have been used to guide the ablation procedure, though contact force (CF) has become the gold standard. In this context, some indexes were developed to guide RFCA[2], such as ablation index (AI) and lesion index (LSI).

Few years ago, ablation catheters capable of monitoring local impedance (LI) while applying RF were developed (e.g. INTELLANAV MIFI™ open irrigated ablation catheter, Boston Scientific). LI has proved to be a good predictor of lesion formation and effective ablation[3] in different arrhythmic substrates, such as atrial fibrillation4 and CTI-dependent atrial flutters[5,6].

More recently, INTELLANAV STABLEPOINT™ catheter (Boston Scientific) was launched with the purpose to provide an optimal lesion monitoring as it combines both LI and CF in the same ablation catheter.

At the same time, there is a growing concern about the x-ray exposure during EP ablation procedures, given its harmful effects on both patients and operators[7]. In our center, we perform most of our ablation procedures with a zero-fluoroscopy approach, including atrioventricular nodal re-entrant tachycardias, accessory pathways, focal atrial tachycardias and CTI-dependent atrial flutters.

In this case report we describe how to perform a CTI ablation with a nearly zero-fluoroscopy approach, using RHYTHMIA HDx™ mapping system (Boston Scientific) and INTELLANAV STABLEPOINT catheter.

CASE PRESENTATION

An 80-year old male with repetitive and symptomatic paroxysmal episodes of CTI-dependent atrial flutter underwent a CTI catheter ablation to improve his quality of life in our institution. The patient rhythm at the beginning of the case was sinus rhythm.

MATERIAL

This right-atrium procedure required the use of RHYTHMIA HDx mapping system and the following catheters:

- VIKING™ fixed curve decapolar diagnostic catheter (Boston Scientific) placed in the coronary sinus (CS)

- INTELLANAV STABLEPOINT standard curve catheter: a 4-mm tip, open- irrigated ablation catheter that includes a magnetic navigation sensor and combines contact force and local impedance

METHODS

Our workflow starts by obtaining the vascular access using an echography-guided double femoral puncture. Following, the magnetic tracked INTELLANAV STABLEPOINT catheter is inserted and guided with RHYTHMIA HDx mapping system to the right atrium and superior vena cava (SVC) (Figure 1). Both structures are recognized by the presence or absence of atrial electrograms.

Figure 1. *Anatomy from vascular access to right atrium created with INTELLANAV STABLEPOINT ablation catheter*

Once INTELLANAV STABLEPOINT is in the right atrium and while it floats in the blood pool prior to create an electroanatomical mapping, the contact force reading is zeroed and local impedance is calibrated. Then, we get the first insights of the characteristics of the cardiac tissue by putting the catheter tip in contact with the chamber wall and registering local impedance value (159Ω).

During electroanatomical mapping with INTELLANAV STABLEPOINT, CF is used to guide catheter maneuvers: we find this approach very useful as it avoids excessive pressure on the atrial wall and minimizes the risk of perforation. While mapping and guided by EGM signals, some structures are tagged on the map such as tricuspid annulus, Hisian region, coronary sinus ostium and CTI superior and inferior borders (Figure 2).

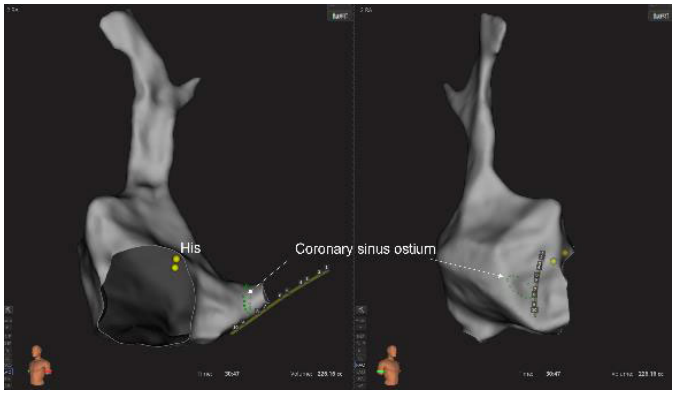

Figure 2. *Anatomy of Right Atrium*

At this time, we verify the optimal status of the field map so any impedance-tracked catheter could be visualized later in the procedure. Subsequently, we introduced and placed a diagnostic catheter (VIKING™ fixed curve decapolar catheter) in the coronary sinus and pace at 600 ms from the proximal bipole.

The ablation is guided using DIRECTSENSE™ technology, a feature that confirms electrical contact and catheter tip-to-tissue stability and provides the Local Impedance value before, during and after the ablation. The targeted local impedance drop values were 30 to 40 ohms for max. 45 seconds in case of not reaching the desired drop and a minimum contact force of 5 grams. Radiofrequency (RF) energy is applied in power control mode (45W) with a temperature limit of 43˚C while pacing from the right atrium at 600 ms cycle length

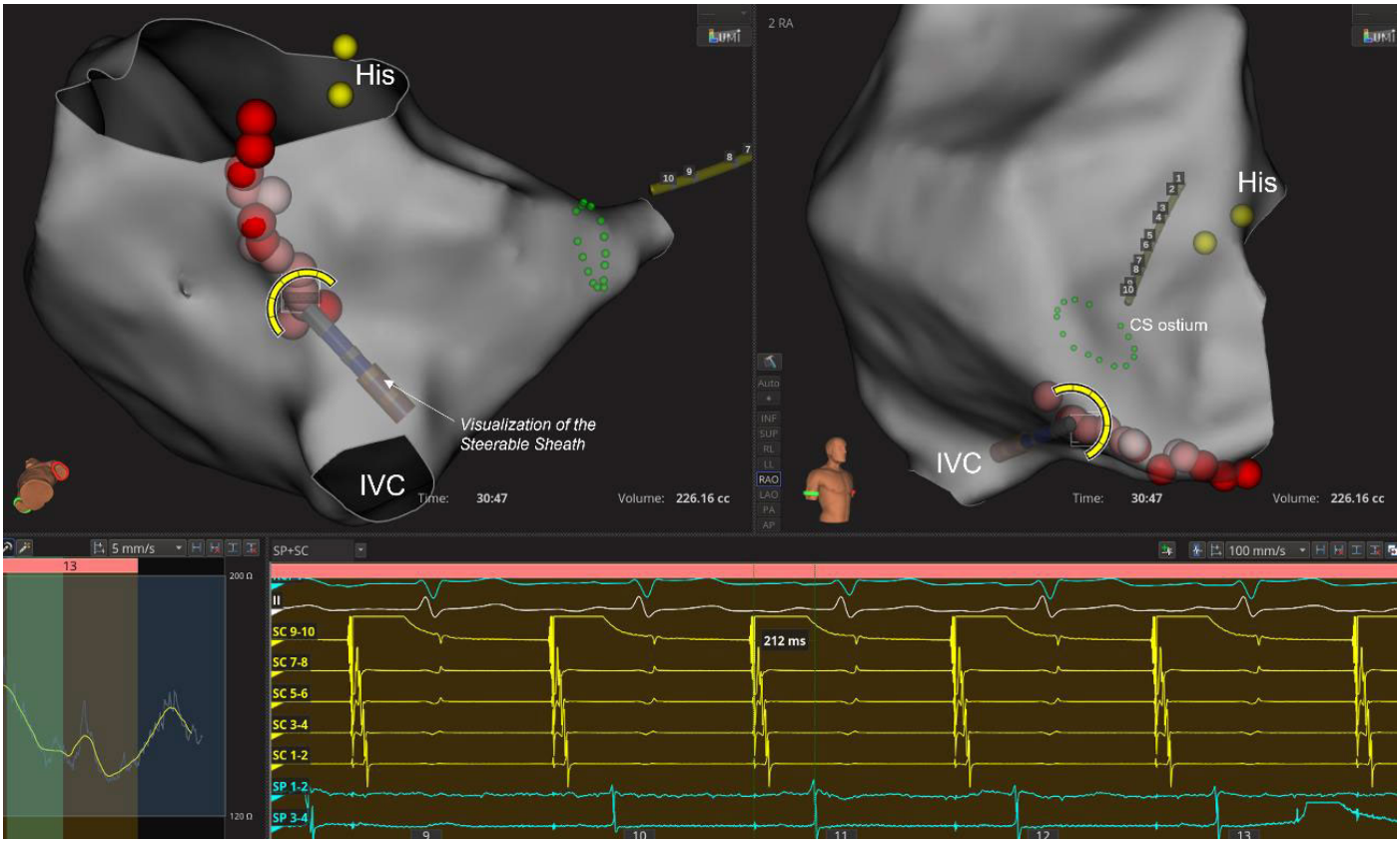

Figure 3. *Tags coloring based on local impedance targets: red > 30 ohms and light pink < 18 ohms. Inferior Vena Cava (IVC)*

to facilitate the visualization of conduction block through the isthmus (Figure 3).

CTI block was obtained after 13 RF applications, registering a mean local impedance drop of -35,91 ohms and an average time of 16 seconds per application.

At the end of the procedure, a validation map of the right atrium was created with INTELLANAV STABLEPOINT catheter while pacing from the coronary sinus (Figure 4). Bidirectional CTI block was demonstrated in the propagation map, and double potentials were registered across the CTI ablation line.

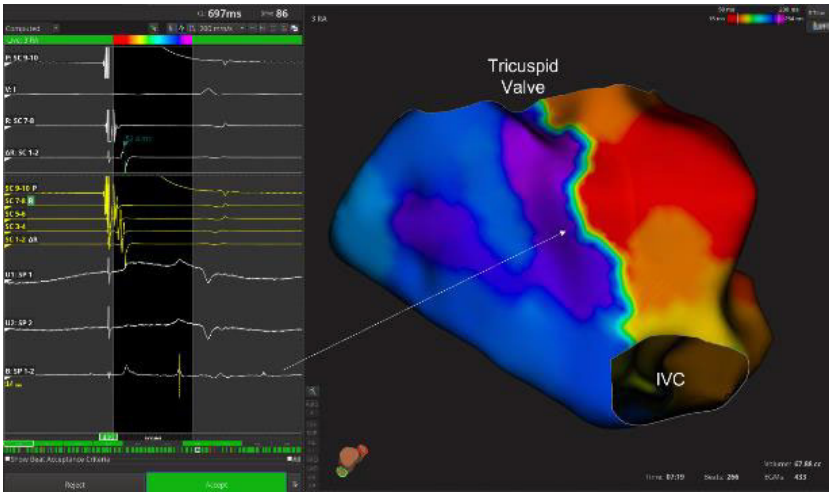

Figure 4. *Validation map showing CTI block.*

CONCLUSIONS

The RHYTHMIA HDx mapping system enables high-density mapping, allowing visualization of magnetic and impedance tracking catheters with sub-millimeter accuracy without the need of fluoroscopy during common flutter ablations. The INTELLANAV STABLEPOINT catheter allows both mapping and ablation guided by DIRECTSENSE technology, monitoring both Contact Force and Local Impedance. LI predicts an optimal lesion formation by avoiding tissue overheating of the CTI, while CF confirms contact at the isthmus and increases the procedure safety by avoiding excessive pressure on the right atrium wall.

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